



Automobile Cooling System

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Necessity

- ❖ **To remove the cylinder wall heat.**
- ❖ **To prevent preignition of charge.**
- ❖ **To prevent burning of the lubricants.**
- ❖ **To do away with possible seizure of the piston.**

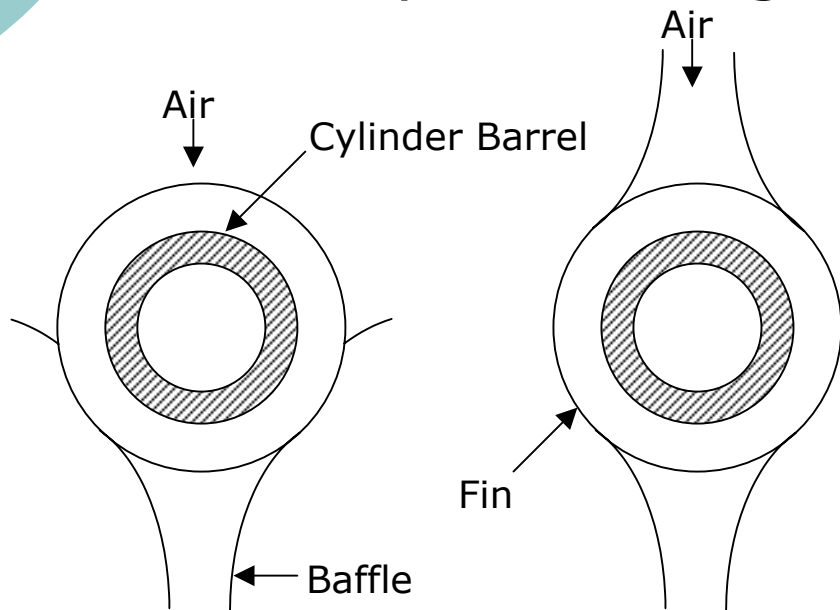


Extent of Cooling

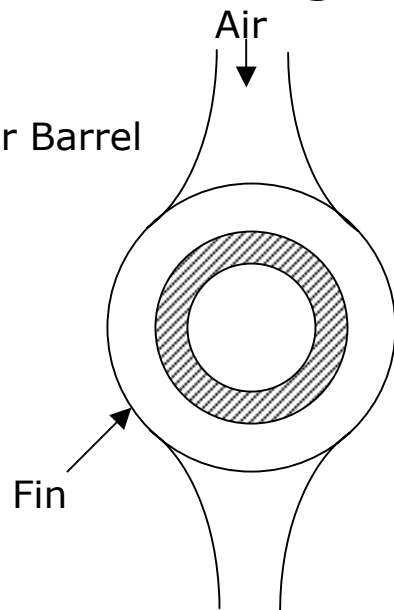
❖ It must be optimal

Methods of Cooling

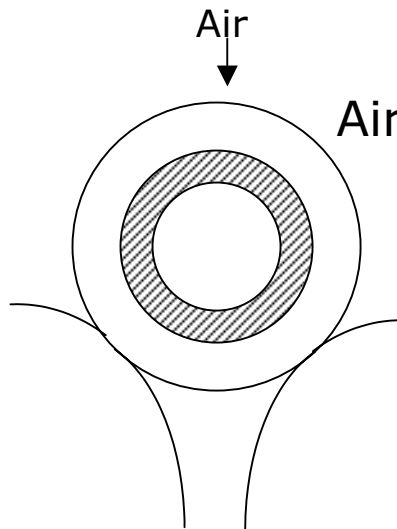
- ❖ Air Cooling
- ❖ Water Cooling
- ❖ Liquid Cooling



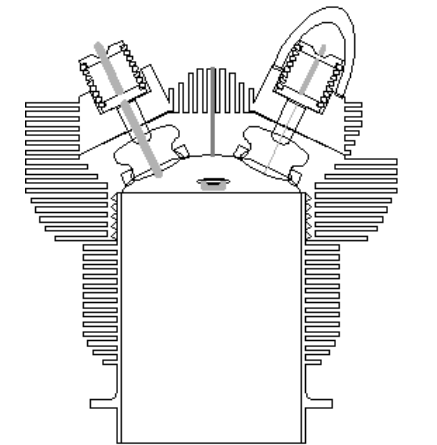
Normal Baffle



Complete Baffle



Short Baffle



Air Cooled Engine

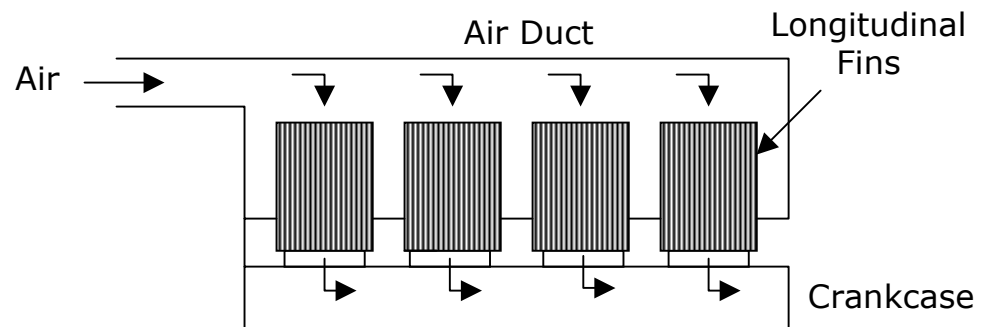
Advantages and Disadvantages of Air Cooled Engines

○ Advantages

- ❖ **Lightness**
- ❖ **Operability at extreme conditions**
- ❖ **Easier Maintenance**
- ❖ **Early Warm up**

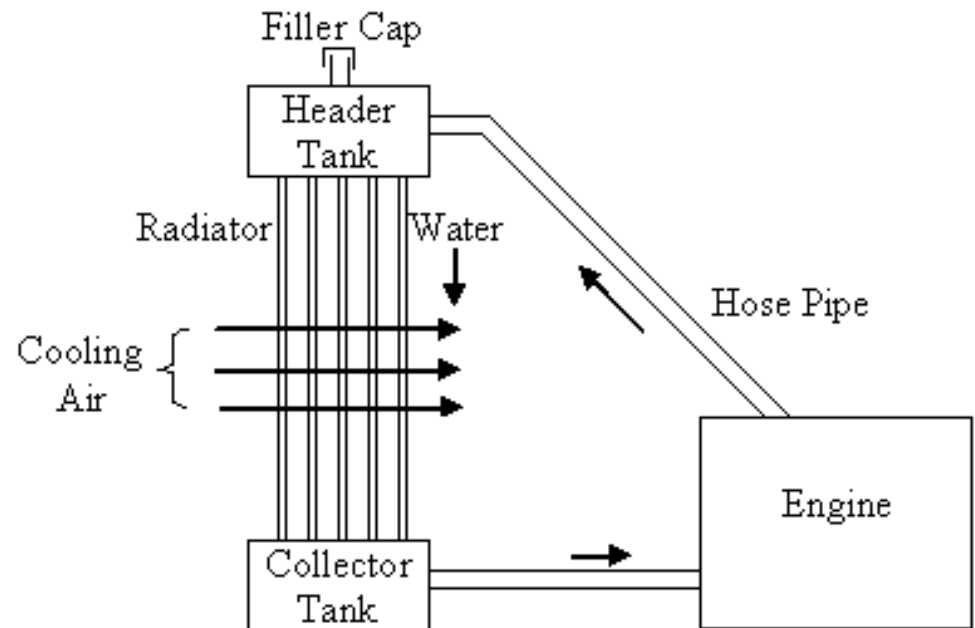
○ Disadvantages

- ❖ **Difficulty in maintaining even cooling**
- ❖ **Less efficient cooling**
- ❖ **Bulky fan**
- ❖ **More noisy**



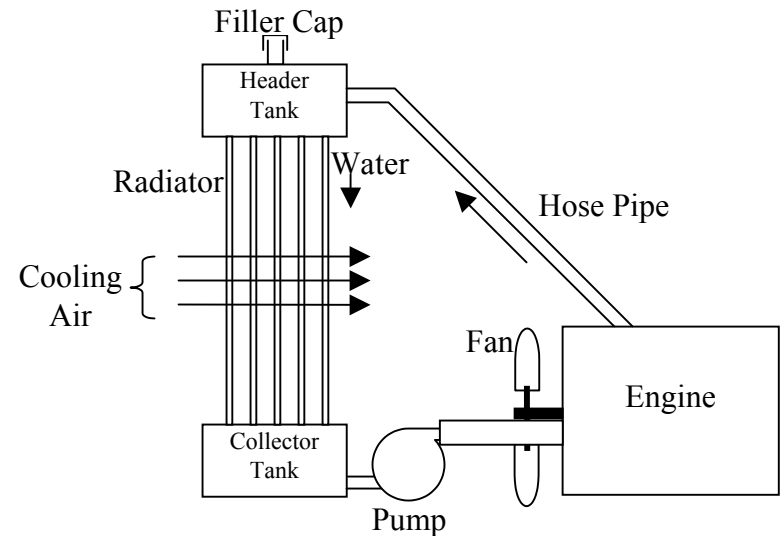
Water Cooling

❖ Thermosyphon System



Pump Circulation System

- ❖ Pump is used for the circulation of cooling water.
- A fan is employed to assist the air flow.





Components of Water Cooling System

- ❖ Radiator
- ❖ Thermostat
- ❖ Pump
- ❖ Fan
- ❖ Hose
- ❖ Heater (Auxiliary)

Radiator

Functions:

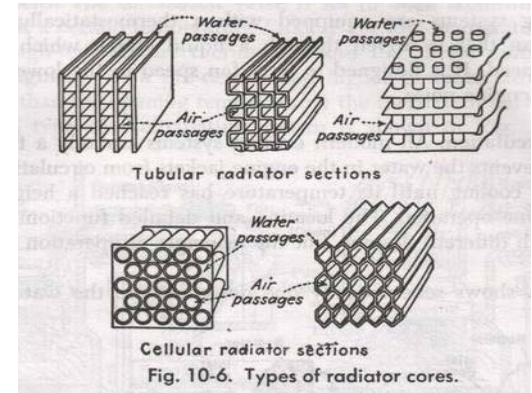
- ❖ A radiator is a type of **heat exchanger**.
- ❖ to transfer heat from the hot coolant to air blown through it.

Construction:

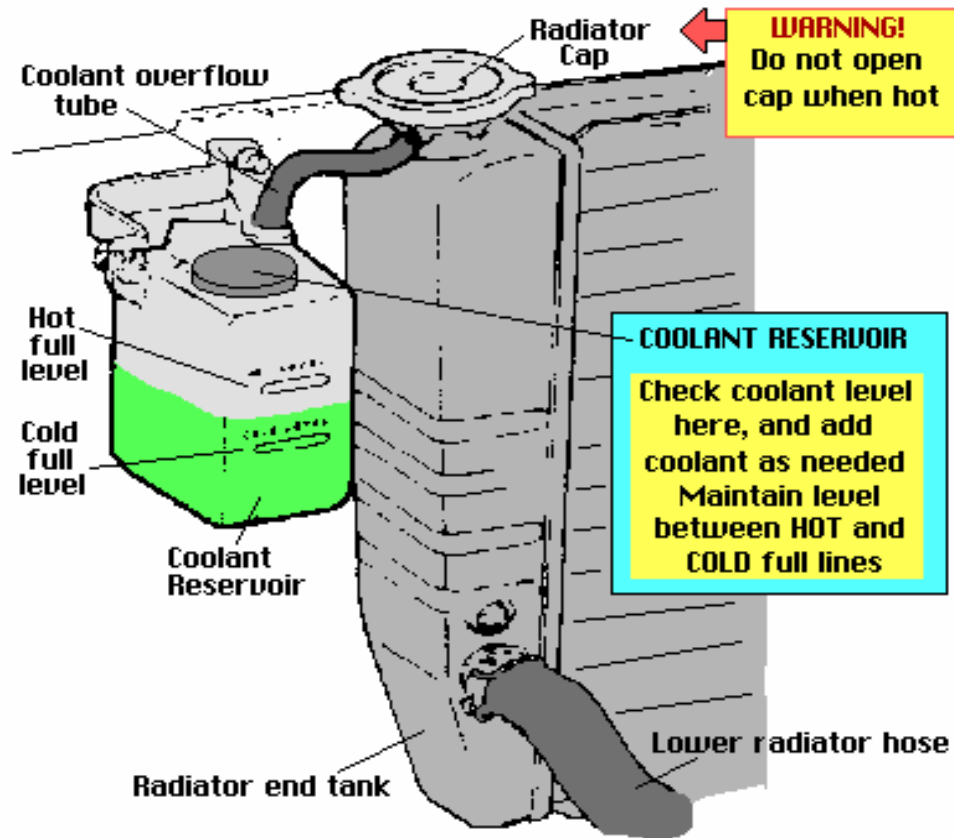
- ❖ Basically it consists of two tanks, a top and a bottom tank,
- ❖ Finned tubes located in the core of the radiator

Components:

- ❖ Header Tank
- ❖ Core
- ❖ Lower Tank
- ❖ Overflow Pipe Tank
- ❖ Cap



Radiator Components



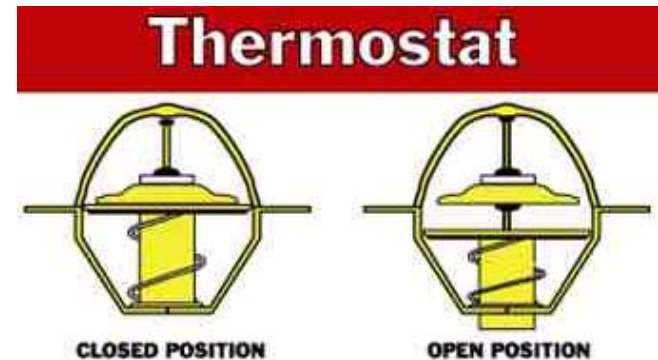
Thermostat

Functions:

- ❖ To block the coolant flow to the radiator
- ❖ To allow the coolant flow to the radiator
- ❖ To regulate the engine temperature.

Types:

- ❖ Bellows or Aneroid type
- ❖ Wax or Hydrostatic type

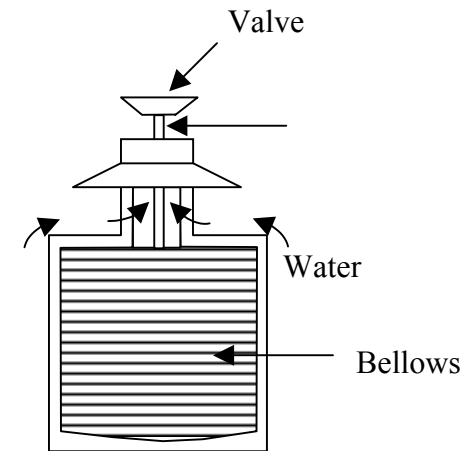


Bellows Type Thermostat

Components

❖ Bellows

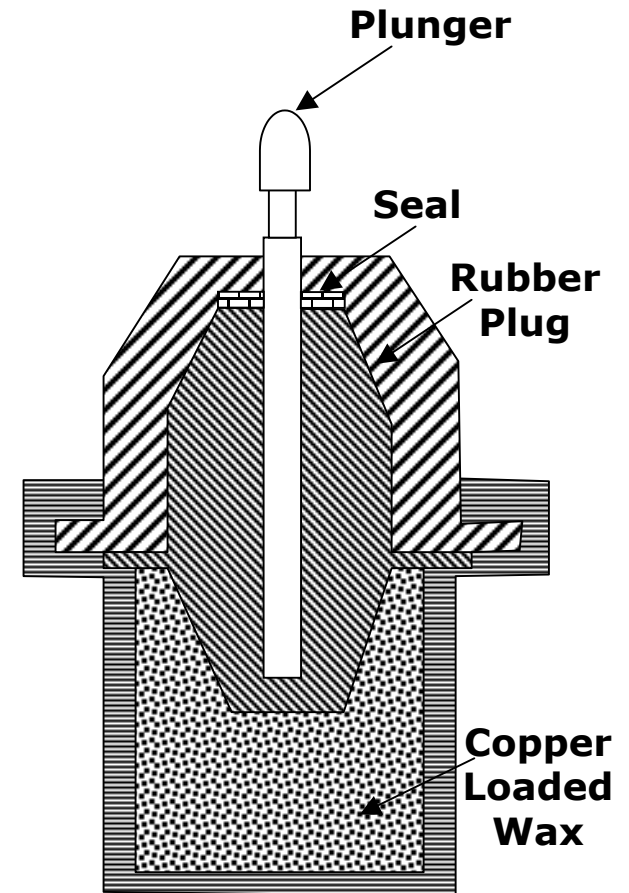
❖ Valves



Wax Thermostat

Components:

- ❖ Copper Loaded Wax
- ❖ Rubber Plunger



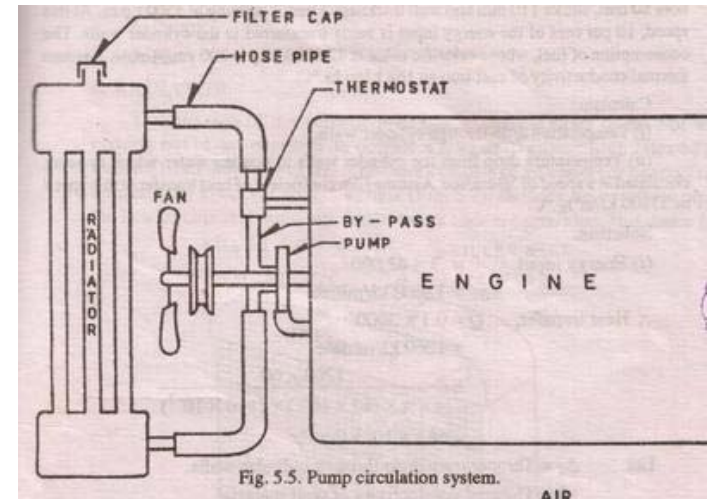
Water Pump

Functions:

- ❖ The pump circulates fluid whenever the engine is running.

Components:

- ❖ Belt connected to the crankshaft of the engine.
- ❖ Hoses





Fan-Functions & Components

Function:

- ❖ To drive the airflow through the radiator

Components:

- ❖ A Fan
- ❖ Drive Mechanism (Belt drive)

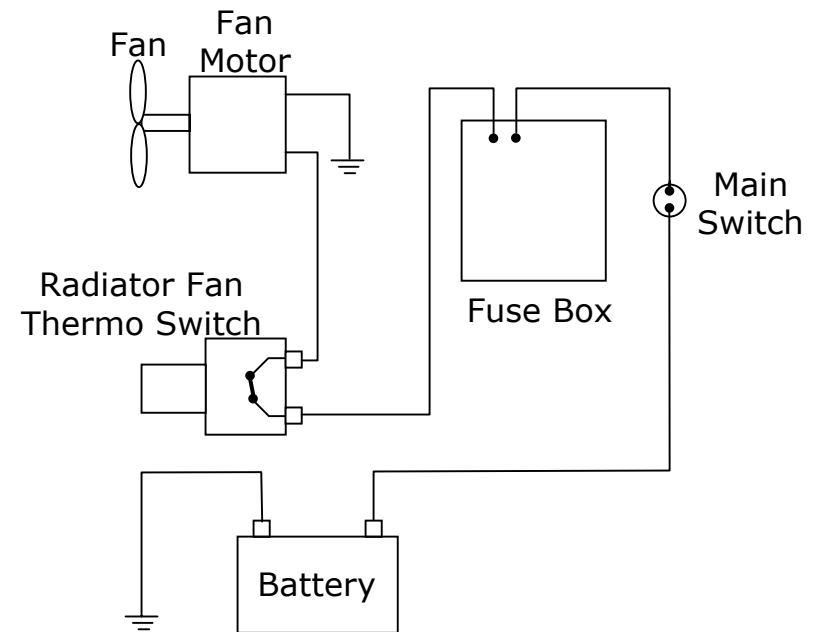
Arrangements:

- ❖ Mounted on the water pump shaft (rear wheel drive).
Thermostatic control, flexible fan blades, variable angles of blades and different number of blades.
- ❖ Independently mounted fans (in front wheel drive cars),
Electrical and Thermostatic Control.

Fan-Illustrations



Fan



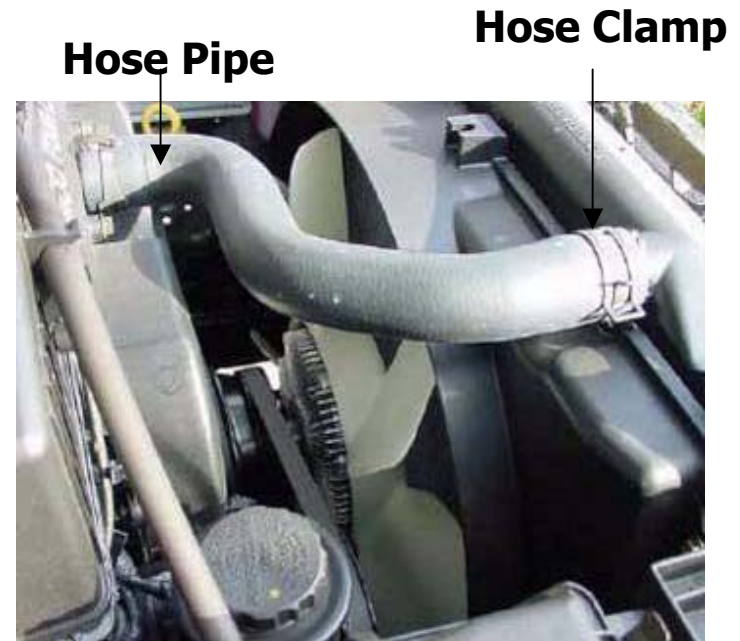
Hoses

Function:

- ❖ To carry hot and cold streams of liquid to the radiator and the engine channel.
- ❖ The interconnecting hoses from radiator to engine and from engine to cabin heater and back again are very special.

Construction:

- ❖ Radiator to engine hoses - metal coil reinforced hoses
- ❖ The bottom hose
- ❖ Hose clamps




Heater

Functions:

- ❖ **Act as a secondary cooling system**
- ❖ **It is not an electric heater**





Other Methods of Cylinder Cooling

❖ Liquid Cooling

❖ Pressure Sealed Cooling

Coolant

	Pure Water	50/50 C ₂ H ₆ O ₂ /Water	70/30 C ₂ H ₆ O ₂ /Water
Freezing Point	0 C / 32 F	-37 C / -35 F	-55 C / -67 F
Boiling Point	100 C / 212 F	106 C / 223 F	113 C / 235 F



Anti Freeze Solutions

Types:

- ❖ Conventional antifreeze
(ethylene glycol base with conventional additives)
- ❖ Extended Life Antifreeze
(ethylene glycol base with carboxylate additives).
- ❖ Non-Toxic Antifreeze

The ethylene glycol antifreezes are harmful or fatal if swallowed or inhaled.

Requirements

1. Miscibility with water.
2. Non-corrosive
3. High boiling point
4. No deposition of foreign matters